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**Center of Gravity and the Range of Military Operations:  
Can An Old Dog Apply To New Tricks?**

by

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**A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.**

**The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.**

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**06 November 2007**

## **Abstract**

The Clausewitzian “center of gravity” is a fixture in US military culture. Joint doctrine goes so far as to mandate its use when planning operations and campaigns across the full range of military operations (ROMO). Despite this, analysis of the term indicates it is neither properly defined nor universally accepted. This paper details the construct’s current definition(s) and application and briefly explains the full range of military operations. It then attempts to validate objectively the underpinnings of Clausewitz’s principle – to include Schwerpunkt, or “focus of effort,” which is his original term for the principle – across ROMO. Finally, the paper draws conclusions about the principle’s current value and offers two recommendations to enhance future operational joint, and interagency, planning.

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*Theory need not be a positive doctrine, a sort of manual for action. . .  
it is an analytical investigation leading to a close acquaintance with the subject.*  
- Carl von Clausewitz, *On War*, p. 141

## **Introduction**

The United States conducts military operations in a “complex, interconnected, and increasingly global operational environment...”<sup>1</sup> Today’s military encounters adversaries of varying natures, uses technology that has advanced very rapidly over the last few decades (e.g., microcomputers, composite materials, the World Wide Web and Global Positioning System), and engages in operations knowing our nation’s tolerance for an attrition style of warfare is extremely low. Our environment can be even more complex when it involves operations that do not actually require the use of lethal military force.

However, we do have tools at our disposal to make sense of highly complex operational environments. US military commanders rely on extensive planning and thorough analysis prior to the commencement of operations, using the time-tested principles of operational art. Joint doctrine validates operational planning’s value, and its necessity, in *Joint Operations*, Joint Publication (JP) 3-0, stating, “The President and SecDef direct joint operation planning to prepare and employ American military power in response to actual and potential contingencies.”<sup>2</sup>

One of the most widely recognized principles of operational art is “center of gravity,” with roots dating back almost two hundred years to Prussian general and theoretician Carl von Clausewitz. His thoughts on the subject, derived while participating in classic maneuver warfare between armies on “limited,” European battlefields, have largely stood the harsh test of time.<sup>3</sup> To date, numerous articles, books and lectures about center of gravity have been published. The concept of center of gravity is taught in basic courses for infantry officer

training and studied at all Joint Professional Military Education (JPME) institutions. However, the concept in its current form is somewhat different from what Clausewitz actually wrote in *On War*. The many years that have passed since *On War*'s publishing have allowed Clausewitz's ideas to be interpreted and applied in varying ways by individuals and services alike. Some may even argue that the concept is dated and has no applicability at all to today's complex operational environments. To disregard its applicability, some argue, is the worst mistake a commander or his staff can make.<sup>4</sup> Still, Clausewitz developed the concept with only lethal combat operations in mind. Even supporters of the center of gravity construct have doubts about its applicability to operations that do not involve actual armed conflict – permissive foreign humanitarian assistance (FHA), for example.<sup>5</sup>

According to the Chairman of the Joint Chiefs of Staff (CJCS), "Planning for joint operations is continuous across the full range of military operations using...the Joint Operation Planning and Execution System (JOPES) and the [Joint Operation Planning Process (JOPP)]." <sup>6</sup> Interestingly, the second step of the JOPP comprises Mission Analysis – in which center(s) of gravity determination is a key step.<sup>7</sup> Seemingly, the CJCS has mandated the construct's use across the full range of military operations despite doubts about its applicability in non-lethal operations.

This paper addressees an important question for military planners: In light of increasingly complex operational environments, is center of gravity relevant to the full range of military operations? The hypothesis of this paper is threefold. First, "center of gravity" remains applicable for planning lethal operations. Second, Clausewitz's original term for the principle, *Schwerpunkt* – which actually translates to "weight (or focus) of effort" – is applicable for planning non-lethal operations.<sup>8</sup> Third, in operations that involve both lethal

and non-lethal operations, use of center of gravity in conjunction with Schwerpunkt is appropriate.

The first part provides background of the center of gravity construct, detailing its current interpretations by individual services, an overview of its current adaptation, and introduces “Schwerpunkt.” Second, it presents joint doctrine’s description of the range of military operations. Three types of operations are selected to represent the full range effectively: major combat operations, Counterinsurgency (COIN) operations and permissive humanitarian assistance (HA). It then discusses the applicability of center of gravity to each of the representative types of operations. The conclusion enforces *center of gravity* and/or *focus of effort* applicability across the full range of military operations. Finally, specific recommendations for altering joint, and interagency, planning doctrine are presented.

### **The Clausewitzian Center of Gravity**

Prussian General Carl von Clausewitz’s theories about strategy and warfare were compiled and published in his treatise, *On War*, in the early nineteenth century. Well-known principles like “value of the object,” “friction” and “culminating point” have their genesis in *On War*. One of the most important principles coming from this great work is *center of gravity*.

In the Howard and Paret translation of *On War*, center of gravity is defined as “the hub of all power and movement, on which everything depends” and “the point against which all our energies should be directed.”<sup>9</sup> Although the words seem simple enough, the concept’s nuances continue to be analyzed and debated by scholars and military professionals. In the last two decades, especially, the US military has expended considerable

effort to understand a concept originating on eighteenth and nineteenth century European battlefields in order to find its practical application to modern warfare.<sup>10</sup>

Clausewitz never actually used the term “center of gravity.”<sup>11</sup> His original term – Schwerpunkt - translates to something else entirely.<sup>12</sup> By misinterpreting Schwerpunkt to “center of gravity,” the principle is forced into a physical metaphor. Unfortunately, its inability to conform to physical laws leaves it open to ambiguous interpretations and is to blame for the disparate definitions of the concept across individual services.<sup>13</sup>

For example, the US Army defines center of gravity as “those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight” and that the quickest way to victory is by destroying or neutralizing it.<sup>14</sup>

US Marine Corps doctrine describes centers of gravity as “important sources of strength.”<sup>15</sup> Depending on the situation, they:

may be intangible characteristics such as resolve or morale. They may be capabilities such as armored forces or aviation strength. They may be localities such as a critical piece of terrain that anchors an entire defensive system. They may be the relationship between two or more components of the system such as the cooperation between two arms, the relations in an alliance, or the junction of two forces.<sup>16</sup>

In both US Army and Marine Corps doctrine, centers of gravity may be locations or pieces of terrain, which is contradictory to joint doctrine which states simply in Joint Publication (JP) 1-02, that center of gravity is “the source of power that provides moral or physical strength, freedom of action, or will to act.”<sup>17</sup> The US Navy agrees with this but adheres to Vego’s definition in *Operational Warfare*, as well. Namely, center of gravity is:

[A] source of massed strength - physical or moral, or a source of leverage - whose serious degradation, dislocation, neutralization or destruction would have the most decisive impact on the enemy’s or one’s own ability to accomplish a given military objective.<sup>18</sup>



Regardless of the variations in definition noted above, the fact that all services recognize the importance of the principle's underpinnings is essential. The Army puts it best: "Center of gravity is a vital analytical tool in the design of campaigns and major operations. Once identified, it becomes the focus of the commander's intent and operational design."<sup>19</sup>

Listed below are aspects of center of gravity collected from various sources which are either already accepted or are the view of accepted experts. Each should be universally accepted for joint operations planning to minimize ambiguities and contradictions across service doctrines:

- Centers of gravity have tangible and intangible elements.<sup>20</sup>
- The higher the level of war, the fewer the number of centers of gravity. There is usually one at the strategic level.<sup>21</sup>
- At the strategic level, examples include political/military leadership, national will, and coalition leadership.
- Operational centers of gravity typically include more tangible aspects of military power. Examples include an armored battalion, a carrier strike group or an integrated air defense system (IADS).<sup>22</sup>
- The number of operational centers of gravity is directly related to the number of operational objectives.<sup>23</sup>
- Centers of gravity at the operational level and below physically endanger one's own center of gravity.<sup>24</sup>
- Centers of gravity are not locations nor are they capabilities. They possess capabilities and/or benefit from certain locations.<sup>25</sup>

Current application commonly involves two steps; (1) center of gravity determination; and (2) analysis to determine how best to achieve desired effects on the center of gravity. Center of gravity determination is crucial because upon it all other calculations are based. However, it is difficult because it requires a great deal of abstract thought. To make center of gravity determination a more structured problem, Vego provides an analytical construct by first determining “critical strengths,” “critical weaknesses” and “critical vulnerabilities” – collectively referred to as “critical factors” – and working backwards from there.<sup>26</sup> However, he also notes that:

...the analytical process by itself cannot ensure that a center of gravity will be properly determined. The knowledge and understanding and, even more important, the judgment and wisdom of the commanders and their staffs are the keys to determining the proper center of gravity...<sup>27</sup>

Once correctly determined, the methods and procedures for engaging the center of gravity need attention. Dr. Joseph Strange lays the groundwork for current doctrine in this regard. Strange’s Center of Gravity-Critical Capabilities-Critical Requirements-Critical Vulnerabilities concept - or simply, the CG-CC-CR-CV concept - has become a widely accepted way for staffs to plan courses of action (COA) that effectively engage (or protect) centers of gravity.<sup>28, 29</sup> This is accomplished by determining pertinent CVs in order to highlight which one (or more) of them to attack in order to achieve decisive effects on the enemy center of gravity (See Figure 1). This process can also help determine which of our CV(s) to protect in order to prevent decisive effects on our own center of gravity.

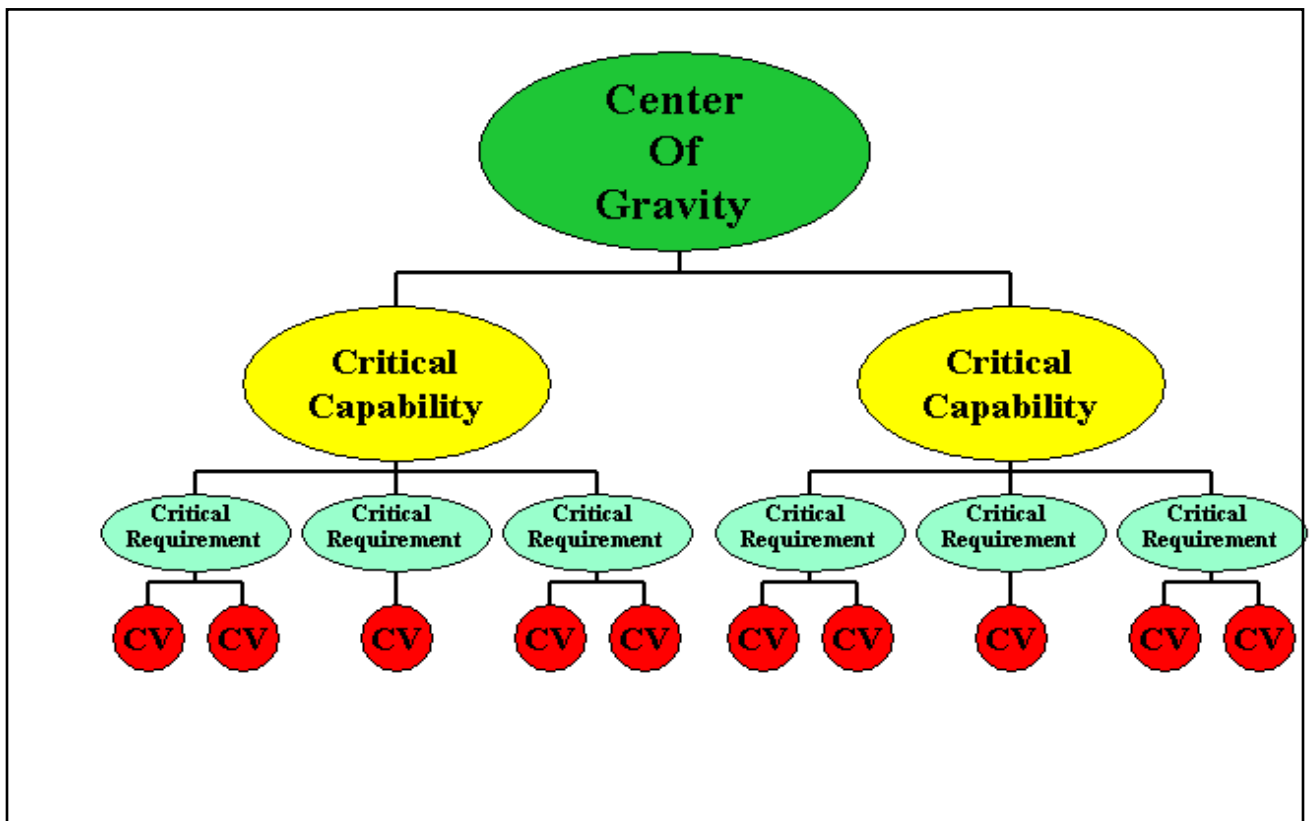
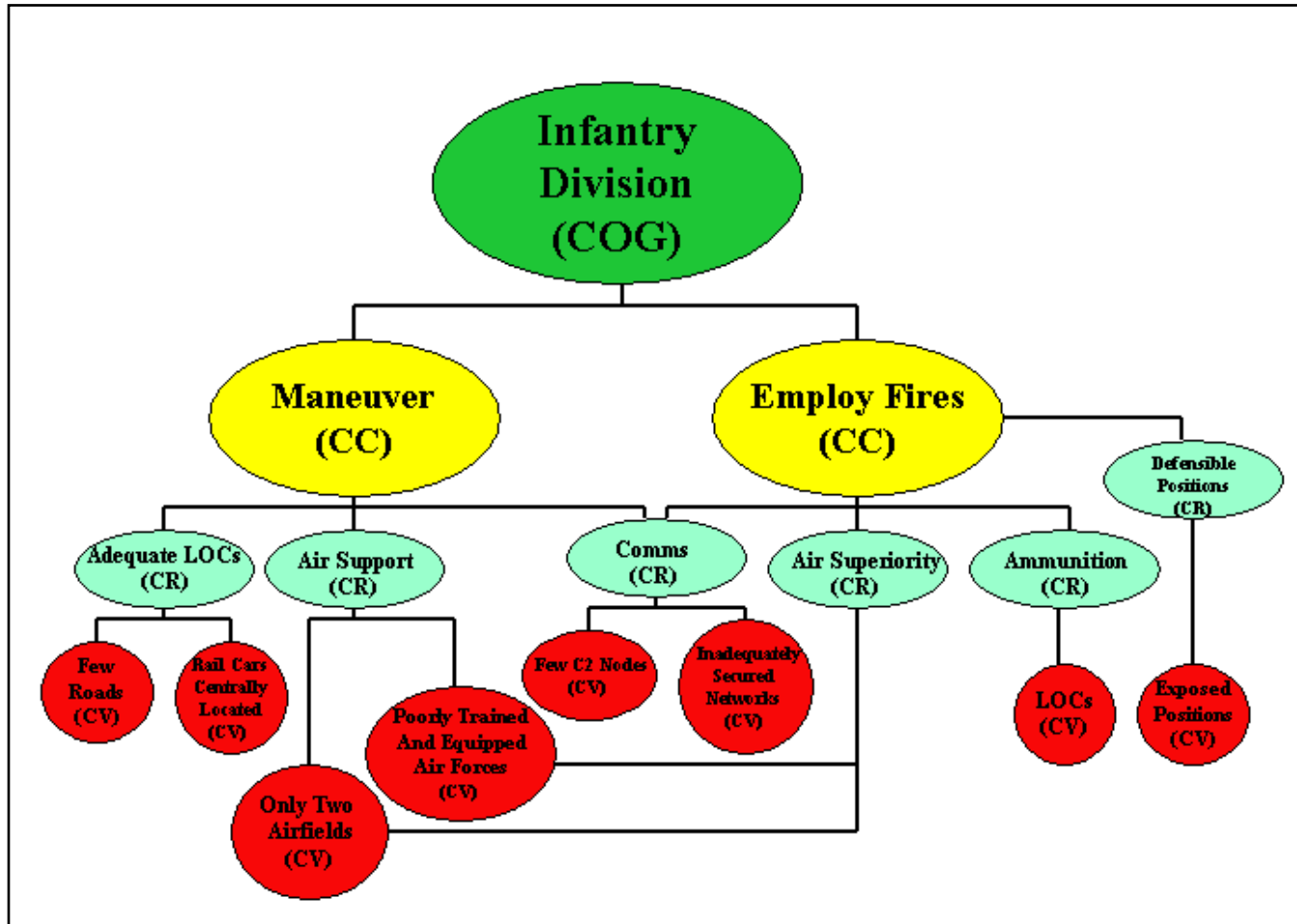


Figure 1. Strange's CG-CC-CR-CV Concept



**Figure 2. Hypothetical example analyzing critical vulnerabilities of a fictional infantry division in order to determine plausible courses of action in order to defeat it.**

Figure 2 displays a hypothetical example of how one can use the concept to determine a likely COA (or integral part of a COA) to achieve an operational objective. In this case, the operational objective is to defeat a fictional infantry division (the operational center of gravity). Of note here, are cases where CRs and CVs are shared between CCs. Although only two of many possible CCs are used in this example, it can be inferred that an air campaign targeting airfields, rail facilities, and C2 nodes with follow-on strikes on exposed enemy positions would be part of a plausible COA.

Operation Desert Storm affords a real-world example. One of the coalition's operational objectives was a decisive ground engagement to expel Iraqi forces from Kuwait. As the Iraqi Republican Guard was the most formidable combat force in the Kuwait Theater of Operations (KTO), it was considered the operational center of gravity. Analysis revealed their Land Lines of Communications (LLOCs) to be a critical vulnerability. Consequently, a course of action that included cutting the LLOCs north of Kuwait before decisively engaging the Republican Guard in Kuwait made good sense.

Let us remind ourselves, however, that “center of gravity” is a mistranslation of Clausewitz's original name for the concept – *Schwerpunkt*. The more accurate translation of *Schwerpunkt* is “weight (or focus) of effort” and “is closer in meaning to what the [US] military now calls the “sector of main effort.”<sup>30</sup> Focus of effort, in other words, is concerned with determining the most effective object for military efforts.

Deciding on the focus of effort involves three main factors: commander's intent, enemy situation, and terrain.<sup>31</sup> Commander's intent provides a “vision of an operational end-state”<sup>32</sup> and aids lower levels of command to “think and act faster than the enemy and to seize the initiative.”<sup>33</sup> Knowledge of the enemy situation and the terrain allows commanders the ability to analyze courses of action.<sup>34</sup> Thus, by using focus of effort analysis, a commander analyzes plausible courses of action that lead to his envisioned end-state. This resembles the center of gravity construct: both deal with determining a central focus “on which everything depends.”<sup>35</sup> However, where center of gravity is doctrinally concerned only with lethal applications of military force, “focus of effort” can be practically applied to non-lethal operations.

Thus, Clausewitz's original principle has effectively spawned two concepts - center of gravity *and* focus of effort. Both offer commanders tools to analyze the most effective application of military resources to achieve operational objectives: the former, a US concept derived from a mistranslation of Schwerpunkt ideally suited to lethal operations; the latter, derived from the correct translation of the same and, although shown to be effective for lethal operations by the German Army during World War II, better suited for US purposes to non-lethal operations.<sup>36</sup>

The following points from the above section are key:

- The higher the level of war, the fewer the number of centers of gravity. At the strategic level there is usually only one.<sup>37</sup>
- The number of operational centers of gravity is directly related to the number of operational objectives.<sup>38</sup>
- Enemy defeat is not complete unless his center of gravity is neutralized.<sup>39</sup>
- “Center of gravity” and “focus of effort” offer commanders analytical tools to determine the most effective application of military resources to achieve objectives in lethal and non-lethal operations, respectively.

### **The Range of Military Operations**

During testimony before the Senate Armed Services Committee, then PACOM Commander Admiral William Fallon assessed security in the Asia-Pacific region, and claimed “the global community’s “center of gravity” is shifting toward [the Asia-Pacific region. And, with the shift in center of gravity comes important ramifications for the United States and PACOM...”<sup>40</sup> Although his comments focus on strategic application of the

principle, senior military leadership clearly recognizes center of gravity's value in areas other than traditional lethal military operations. This section reviews the types of operation, lethal and non-lethal, in which the US military may be called upon to employ its military resources.

According to JP 3-0, US forces are available for a range of military operations (ROMO) that “extends from military engagement, security cooperation, and deterrence activities to crisis response and limited contingency operations and, if necessary, major operations and campaigns.”<sup>41</sup> These operations can vary in “size, purpose, and combat intensity.”<sup>42</sup> Joint doctrine divides ROMO into three categories:

- **Major Operations and Campaigns**
- **Crisis Response and Limited Contingency Operations**
- **Military Engagement, Security Cooperation and Deterrence**<sup>43</sup>

**Major operations and campaigns** involve large-scale combat in which the goal is “to prevail against the enemy as quickly as possible, conclude hostilities, and establish conditions favorable to the [host nation,] the United States and its multinational partners.”<sup>44</sup>

Protecting US interests is the general strategic and operational objective in **military engagement, security cooperation and deterrence operations**.<sup>45</sup> The overall intent is to foster foreign relationships through contact with members of the US Armed Forces in order to “build trust and confidence, share information, coordinate mutual activities, and maintain influence” as well as to build foreign defense capabilities and deter adversary action toward our allies by presenting a credible threat of counteraction.<sup>46</sup> Such operations include “nation assistance to include foreign internal defense (FID), security assistance, humanitarian assistance and civic assistance (HCA); antiterrorism; DOD support to counterdrug (CD) operations; show of force operations; and arms control...”<sup>47</sup> Counterinsurgency (COIN)

operations fall into this category, as well, as they can be included under the general categories of FID and security assistance.<sup>48</sup>

In **crisis response and limited contingency operations**, the strategic and operational objectives remain to protect US interests. Here, however, an additional aim is to prevent surprise attack or further conflict.<sup>49</sup> This category includes foreign humanitarian assistance (FHA), strikes, raids, peace operations (PO), noncombatant evacuation operations (NEO), or recovery operations.<sup>50</sup> All will likely involve cooperation with other government agencies (OGAs), nongovernmental organizations (NGOs) and/or intergovernmental organizations (IGOs).<sup>51</sup>

Three types of operations provide an adequate representation of each category with respect to levels of lethal and/or non-lethal application of US military resources - major operations, counterinsurgencies (COIN), and permissive foreign humanitarian assistance (FHA). These three types are analyzed in the next section to determine applicability of Clausewitz's concept to the modern range of military operations.

### **The Applicability of Center of Gravity Across the Range of Military Operations**

The essence of analysis is to break down highly complex problems into reasonably well-defined and manageable "pieces" whose inter-relationships can be understood. For the JTF commander, analysis aids in developing courses of action based upon these pieces. Whether or not it is the form of "center of gravity" or "focus of effort," Clausewitz's Schwerpunkt has proven itself to be a consistently useful tool in this regard throughout military history. This will continue to be true across the full range of military operations- no matter how complex the environment or how advanced the technology - if certain aspects of



the military operation exist. Those aspects obtain if the answer is “yes” to all four of these questions:

- Is there an enemy (tangible or intangible)?
- If there is a defined enemy, is there a central source of power that materially influences our theater-strategic success (i.e., centralized leadership or national will)?
- Are there defined operational objectives for the JTF commander (CJTF)?
- If so, is there a central source of power that materially influences operational success?

Choosing between center of gravity analysis and focus of effort should be based upon the requirement for lethal or non-lethal means.

## **Major Operations**

Campaigns during Clausewitz’s time involved standing armies engaging on well-defined, European battlefields employing maneuver and fires. Today, major operations involve massive joint task forces (JTF) with heavy coalition participation and, frequently, OGA, IGO, and NGO participation. Moreover, they employ technologies far superior to any envisioned in the late eighteenth century. Today’s major operations expand factors of space, time and force to levels exponentially larger and more complex than 200 years ago when Clausewitz was writing. In fact, when one considers B-2 bomber strikes launched directly from US soil against Taliban forces in Afghanistan during Operation Enduring Freedom, even major operations of just a few decades ago were limited in factors of space and force compared to those of today.

However, three constants aid in determining center of gravity's applicability to major operations. First, major operations involve combat operations specifically designed to impose our political will on a *defined enemy*. Second, the *will of the leadership* materially affects our theater-strategic success (i.e., the enemy's "vote" matters). Third, every operation has various *defined operational objectives*. Examples (with associated *sources of power materially influencing our operational success*) include air superiority (enemy Integrated Air Defense System), decisive engagement of crucial ground forces (enemy's most capable ground unit), or establishment of sea control in the area of operations (enemy submarines). The associated operational objectives almost exclusively involve the use of lethal force for successful achievement so center of gravity analysis is appropriate.

### **Counterinsurgencies**

*Counterinsurgency*, Army Field Manual (FM) 3-24, describes general categories of insurgencies that US Armed Forces may encounter. They include conspiratorial insurgencies, military-focused, revolutionary movements, protracted popular wars (the Chinese Communist movement under Mao Zedong, for example) and urban insurgencies (e.g., the Irish Republican Army).<sup>52</sup> All of these have an enemy that has motivations (e.g., radical ideology), operational and strategic objectives, and key leaders or personalities necessary for fostering much needed popular support.<sup>53</sup> In addition, they contain factors contributing to conventional orders of battle (e.g., training, logistics, composition, strength and disposition).<sup>54</sup>

In each type of insurgency *an enemy exists*, one that possesses a *central source of power materially influencing our theater-strategic success* (e.g., insurgent leadership or

ideology). Additionally, our counterinsurgency efforts will have *defined operational objectives* with their own *sources of power materially influencing operational success*. Examples of operational objectives may include the capture of insurgent leadership, destruction of training facilities, or the neutralization of insurgent lines of communication with respective sources of power to include an elaborate security apparatus, a foreign nation who provides safe haven, and the mobile phone network.

With “yes” answers to the four key questions, it is apparent that traditional center of gravity analysis is applicable to these tangible aspects of counterinsurgencies. However, insurgencies exhibit intangible aspects, as well, which can make insurgency centers of gravity extremely difficult to determine and/or attack.

One of the most important intangibles associated with any insurgency is its ability to generate popular support. This above all else contributes to the insurgency’s long-term effectiveness.<sup>55</sup> Therefore, popular support can actually be the central source of power materially influencing our theater-strategic success, regardless of what the support is based upon (radical ideology, nationalism, etc.).<sup>56</sup> As such, COIN operational objectives may include physical security assurance or information dominance in order to erode the insurgency’s access to the population. These intangible qualities are what make COIN operations extraordinarily difficult and center of gravity analysis difficult to apply because Strange’s CG-CC-CR-CV framework is too structured to be sufficiently applicable to intangibles. “Focus of effort” analysis, on the other hand, is much less structured in its method by simply aiming to determine a central focus “on which everything depends” abstractly.<sup>57</sup>

## Humanitarian Assistance Operations

Permissive humanitarian assistance (HA) - especially in cases of assistance on US soil - is the least lethal in the range of military operations, and quite possibly, the most complex with respect to intangible aspects. The need for military firepower is strictly defensive in nature focusing on force protection. Senior leaders are not in control of factor time because the operation is usually in response to a natural disaster. And, the theater-strategic objective does not involve asserting political will - although, political objectives do exist (e.g., regional stability). In order to determine the applicability of Clausewitz's principle to this type of operation, answers to the four questions at the beginning of this section help.

First, is there a defined enemy? The answer is "yes," but the enemy lies in the realm of the intangible. Our nation became victim to "one of the most destructive and costly natural disasters in American history."<sup>58</sup> Following landfall of Hurricanes Katrina and Rita on the US Gulf Coast in 2005, many citizens were injured or killed, thousands were stranded in their attics or rooftops due to the flooding associated with the breached New Orleans levee system, and all lines of communication were severely damaged or destroyed.<sup>59</sup> The disaster quickly "exceeded the response capabilities of state and local agencies"<sup>60</sup> and required "the largest commitment of U.S. military forces on home soil in recent history."<sup>61</sup> For the commander of Joint Task Force Katrina (CJTF-Katrina), LTG Russel Honore, who was in charge of coordinating resources in the AOO, *time* was the enemy. It could also be considered the source of power whose "interference" *materially influenced our theater-strategic success* (restoration of Gulf Coast security).

In addition, specific *operational objectives existed* with associated *sources of power materially influencing operational success*. They included resource support (the pre-positioning and distribution of supplies), public health and medical services security and urban search and rescue.<sup>62</sup> Associated sources of power in these cases included lines of communication, logistics and time, respectively. Additional objectives included restoration of civil infrastructure and, as mentioned earlier, force protection – which, for CJTF planning purposes, relies more on determining one’s own center(s) of gravity and developing courses of action to protect it (them).

Although factors affecting HA success can be quite intangible with respect to more traditional military operations, they do exist. Therefore, Clausewitz’s principle applies. However, as the application of military force is predominantly non-lethal, and the objectives require more abstract thought to pinpoint, focus of effort analysis would be a more effective tool because focus of effort’s application is inherently more abstract than center of gravity’s.

## **Conclusions**

Center of gravity analysis remains applicable to major combat operations. In the case of counterinsurgencies, tangible and intangible aspects exist. On one hand, a definable enemy exists to which lethal applications of force can be directed. On the other hand, popular support is arguably the central source of power directly influencing theater-strategic, and operational, success, which requires less-than-lethal methods to neutralize. Due to the combination of tangible and intangible characteristics, center of gravity *and* focus of effort principles are applicable. With respect to humanitarian assistance, there exists an abstract “enemy” (e.g., time), which is also a central source of power directly influencing success.

Additionally, operational objectives exist. However, the non-lethal nature of operations, and the abstract quality of the “enemy,” provides impetus for the inclusion of Schwerpunkt in analysis.

In conclusion, the Clausewitzian Center of Gravity does apply across the full range of military operations. In the end, the principle’s usefulness, as is the case for any of operational art’s principles, lies in the ability of commanders and staffs to use its underpinnings in order to focus operational efforts effectively and achieve success in the most efficient manner. JPME institutions do a fine job of introducing the concept, but it is up to the individual to absorb and apply it. Just as in other art forms, some “get it” and some do not. This aptitude cannot be taught. Commanders and planners who understand center of gravity’s underpinnings are able to apply them effectively despite its varied and, at times, ambiguous definitions. In addition, true *military artisans* are able to manipulate the principles they’ve been taught and to apply them more broadly, when necessary, incorporating new ideas when presented (i.e., “focus of effort”).<sup>63</sup>

## **Recommendations**

**The Chairman of the Joint Chiefs of Staff (CJCS) should add “focus of effort” analysis to joint doctrine as a tool to be used in conjunction with center of gravity analysis.** Center of gravity’s exclusive use restricts the principle’s applicability across the full range of military operations. “Focus of effort” is actually a more accurate translation of Clausewitz’s Schwerpunkt principle and allows more universal application – even to lethal operations.<sup>64</sup> However, “center of gravity” is so engrained in our military culture its abandonment for yet another “term du jour” would be counterproductive.<sup>65</sup> Therefore,

including both forms of analysis in joint planning gives commanders and staffs the flexibility to plan both lethal and non-lethal applications of military resources effectively using the underpinnings of Clausewitz's original construct.

**All US governmental agencies should be directed to expose their leaders and planning staffs to the principles of center of gravity (and focus of effort) analysis.**

Planning for major combat operations is indeed a highly complex venture. However, planning for operations like nation assistance or humanitarian assistance prove to be at least as complex due to necessary interagency participation. Historically, poor interagency planning and operational execution is the result of reading from different "sheets of music."<sup>66</sup> Center of gravity/focus of effort analysis during planning by all agencies would be one way of bridging gaps in our planning processes and set the stage for interagency, and operational, success. Exposure would not be extraordinarily complex, considering OGA representation already exists at all JPME institutions.

## Notes

All notes appear in shortened form. For full details, see the appropriate entry in the bibliography.

- 1 *Joint Operations*, Joint Publication (JP) 3-0, ix.
- 2 Ibid. IV-1.
- 3 “Limited” is used to describe the limited scope of “Factor-Space” with respect to today’s areas of operations.
- 4 Milan Vego, *Operational Warfare*, 307.
- 5 Dr. Milan Vego, in discussion with author at the US Naval War College, 01 October 2007.
- 6 JP 3-0, IV-1.
- 7 *Joint Operation Planning*, Joint Publication (JP) 5-0, II-20, 21.
- 8 Milan Vego, “Clausewitz’s Schwerpunkt: Mistranslated from German-Misunderstood in English,” 101. In my opinion, “focus of effort” vice “weight of effort” more clearly separates the concept from a physical metaphor, which is one of the reasons I believe center of gravity is open to such varied interpretations.
- 9 Carl von Clausewitz, *On War*, 595-596.
- 10 Antulio Echevaria, *Clausewitz’s Center of Gravity: Changing Our Warfighting Doctrine-Again!*, v.
- 11 Milan Vego, “Clausewitz’s Schwerpunkt: Mistranslated from German-Misunderstood in English,” 101.
- 12 Ibid.
- 13 If one wants to knock an object “off balance,” striking its center of gravity is less efficient than striking as far away from the center of gravity as possible. Less force is required because more leverage is generated the further away from the center of gravity force is applied.
- 14 *Operations*, Army Field Manual (FM) 3-0, para. 5.27.
- 15 *Warfighting*, Fleet Marine Force Manual 1, 46.
- 16 Ibid.
- 17 *Department of Defense Dictionary of Military and Associated Terms*, Joint Publication (JP) 1-02, 80.
- 18 Vego, *Operational Warfare*, 309.
- 19 *Operations*, Army Field Manual (FM) 3-0, para. 5.27.
- 20 Vego, *Operational Warfare*, 310-311.
- 21 Ibid. 313.
- 22 Ibid. 310-311.
- 23 Ibid. 313.
- 24 Ibid. 312.
- 25 Joseph Strange, *Centers of Gravity & Critical Vulnerabilities: Building on the Clausewitzian Foundation So That We Can All Speak the Same Language*, 48.
- 26 Vego, *Operational Warfare*, 307. Dr. Vego defines “critical factors” as critical strengths and weaknesses.
- 27 Milan Vego, “On Center of Gravity,” 41.
- 28 Strange, 43.
- 29 The reader should be careful not to confuse Strange’s use of the term “critical vulnerability” and that of Vego’s. Although it shares similarities in definition, it is used differently in the CG-CC-CR-CV concept.
- 30 Vego, “Clausewitz’s Schwerpunkt: Mistranslated from German-Misunderstood in English,” 101.
- 31 Ibid. 103.
- 32 Ibid.
- 33 Ibid.
- 34 Ibid.
- 35 Clausewitz, 595-596.
- 36 Vego describes the German World War II application of Schwerpunkt at the Battle of the Bulge. See Vego, “Clausewitz’s Schwerpunkt: Mistranslated from German-Misunderstood in English,” 104.
- 37 Vego, *Operational Warfare*, 313.
- 38 Ibid.
- 39 Milan Vego, “On Center of Gravity,” 24.
- 40 Admiral William J. Fallon, “Testimony,” Senate, *Senate Armed Services Committee on U.S. Pacific Command Posture, Testimony of Admiral William J. Fallon*, 109th Congress 1st



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sess., 08 March 2005, <http://www.dod.mil/dodgc/olc/docs/test05-03-08Fallon.doc> (accessed on 20 October 2007).

41 JP 3-0, I-12.

42 Ibid.

43 Ibid. I-12-14.

44 Ibid.

45 Ibid. I-12.

46 Ibid. I-12-13.

47 Ibid.

48 Ibid. VII-9-10.

49 Ibid. I-13.

50 Ibid. I-14.

51 Ibid.

52 *Counterinsurgency*, Army Field Manual (FM) 3-24, I-6-8.

53 Ibid. 3-13.

54 Ibid.

55 Ibid.

56 FM 3-24, 3-13.

57 Clausewitz, 595-596.

58 LTG Russel Honore and COL (Ret.) Barney Barnhill, "Joint Task Force Katrina: See First-Understand First-Act First," 5.

59 Ibid.

60 Ibid.

61 Ibid.

62 Ibid. 8.

63 Aspects of Operational Art such as Center of Gravity, Operational Factors and Operational Leadership are, as the name implies, principles of art and not science. Therefore, one who is skilled in their application should be referred to as an "artisan" vice an "expert" or "genius."

64 Milan Vego, "Clausewitz's Schwerpunkt: Mistranslated from German-Misunderstood in English," 101.

65 The US Navy's failed attempt to add Dr. W. Edwards Deming's Total Quality Management principles to Navy doctrine in the mid-1990s under the moniker "Total Quality Leadership" comes to mind.

66 Flournoy, Michele A. and Shawn Brimley, "In Search of Harmony Orchestrating 'The Interagency' for the Long War," 2.

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